DOCUMENT RESUME

ED 253 151 HE 018 056

AUTHOR Ohlsson, Rolf; Nilsson, Anders
TITLE The Labor Market and Structural Changes in the Economy: Higher Education as a Sorting Device?
INSTITUTION National Swedish Board of Universities and Colleges, Stockholm. Research and Development Unit.
PUB DATE 3 Dec 84
NOTE 20p.
AVAILABLE FROM National Board of Universities and Colleges, R&D Unit, P.O. Box 45501, S-104 30 Stockholm, Sweden.
PUB TYPE Reports - Descriptive (141) -- Collected Works - Serials (022)
JOURNAL CIT Swedish Research on Higher Education; 1984:7

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Career Planning; *College Role; *Economic Climate; *Education Work Relationship; *Employment Patterns; Foreign Countries; Higher Education; Labor Force Development; *Labor Market; Occupational Mobility; Salaries
IDENTIFIERS *Sweden

ABSTRACT

The Swedish employment structure and the role of colleges in preparing people for work is being studied by the Swedish Research on Higher Education program. The project is designed to: survey changes in the Swedish economy and employment structure during the postwar period; assess the extent to which business and industry have given priority to the cognitive function of education, as opposed to the function of creating and transmitting information about the student; and to examine the extent to which higher education has adapted to changes in the employment structure. Topics of concern include: mobility in the labor market, wages at the recruiting stage as well as after the first years of employment, changes in the hierarchy of employees, and unemployment statistics. Attempts by the Swedish government to steer higher education in the direction of vocational training are also assessed. The study is based on the assumption that colleges generate and collect information about the students' abilities, which is transmitted to the student and to employers. Education develops students' skills and therefore increases the individual's productivity. Different theories/models of the role of colleges are discussed, including the human-capital theory, sorting models, and filtering/screening models. (SW)

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ISSN 0281-3408

Swedish Research on Higher Education

ED253151

1984:7

NEW PROJECT

TITLE OF PROJECT: THE LABOUR MARKET AND STRUCTURAL CHANGES IN THE ECONOMY - HIGHER EDUCATION AS A SORTING DEVICE?

IN PROGRESS AT: Department of Economic History
University of Lund
Finngatan 16
S-223 62 LUND
Sweden
tel: +46 46 10 74 77

PROJECT LEADERS: Ass. prof. Rolf Ohlsson,
Anders Nilsson, Ph. D.

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SUMMARY

This project is part of the Swedish Research on Higher Education program. It deals with the issue whether changes in the employment structure may have influenced the priority given by the employers to different functions of education. One of our points of departure is the series of descriptions and interpretations of the structure of the labour market which have emerged in recent years. They are based on the conception that the character of the labour market is dual and that the two segments function in completely different ways. Our interest is focussed on the upper segment which is characterized by, among other things, a hierarchic structure of positions, large elements of specific training, and a manifest search for "the right man in the right place". During the postwar period the upper segment has grown drastically while the lower one has stagnated.

HE 018 056

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National Board of Universities and Colleges
R & D unit
P.O. Box 45501
S-104 30 Stockholm SWEDEN
PHONE
+ 46 8 24 85 60

Our second point of departure is the change in the conception of the role of formal education in an economic perspective. The human-capital theory, which used to be dominating, postulates that the main role of education is to produce cognitive knowledge and skills which increase the productivity of those educated. This view deals primarily with the lower segment of the labour market. With the increasing importance of the upper segment, the human-capital theory seems less relevant. In its stead, a number of alternative models have been formulated. All of them emphasize that the most important function of education is to create and provide information (screening, signalling and sorting models).

The basic hypothesis of the present study has been formulated on the basis of the changes during the postwar period, discussed above; namely, that employers have attached increasingly less importance to the cognitive function of formal education, instead giving priority to another function of formal education, i.e. that of creating and providing information. Our three objectives are:

to survey the changes in Swedish economy during the postwar period and to describe the changes in the employment structure in greater detail,

to elucidate the extent to which firms have given priority to the cognitive function of education as opposed to other functions and whether these priorities have changed over the years,

to examine to what extent higher education has been adapted to changes in the employment structure.

THE HISTORICAL BACKGROUND

From 1945 up to about 1970 the development in the industrialized countries has been characterized by a growth of production and productivity which is unique, seen from a historical perspective. The reasons behind this growth are to be found in a specific complex of circumstances, such as, for instance, increased internationalisation with an increase in free trade and migration across national borders, large investments in infrastructure, and an improved production technique. It might be said that these circumstances reinforced one another, greatly promoting economic growth.

However, this development also entailed marked changes in the labour market and in the structure of industries and jobs. In the first place, the volume of employment increased as a consequence of, among other things, women entering the labour

market at an unprecedented rate. Secondly, there was a large-scale shift in employment between the various industries. Thus the tertiary sector (services)increased its share of the total work force at the cost of the secondary sector (the manufacturing industry), and by the late 1960s it had become the largest sector as regards the number of employees. At this time there were signs that the actual number of workers in the manufacturing industry was decreasing. These changes further meant that the number of white collar and professional employees rose drastically. Furthermore, within the various industries in the secondary sector, there was also a re-distribution from blue-collar to white-collar jobs. Up to 1970 white-collar jobs, especially within the public sector, could continue to increase relatively easily due to the general growth of the economy.

Education was an important factor in these changes in the pattern of employment. The structural change entailed an increased demand for workers with a higher level of education than before, which put pressure on the governments to adapt higher education to the changes in the economy. However, another reason behind increased investment in education was the conception that education, generally speaking, would promote production, thus boosting the economic growth of the community. This conception came to be anchored in an economic theory of the function of education and of its economic role in society, the so-called human-capital theory. According to this theory, education can be viewed as an investment which raises the productivity of the individual, thus leading to his getting a higher wage than if he had not made this investment in education. This theory of education was also related to the neo-classical theory of the structure and function of the labour market.

Since 1970 the economic development has changed radically with structural and cyclical crises in the economy where a chronically high level of unemployment, marked inflation, and a low investment propensity have been important factors. Without exaggeration, it might be stated that several of the

conditions which reinforced each other between 1945 and 1970, thus promoting growth, are now in opposition to each other, impeding continued growth. One example would be the changes that have taken place in the area of employment. The tertiary sector has continued to grow at the same rate as earlier, simultaneously as the secondary sector has declined drastically. In combination with the marked difference in the productivity development of the two sectors, this has created severe structural tensions in the economy.

The development during the 1970s has in many cases brought forth criticism and re-evaluations of established economic theories, as it is believed that these no longer supply acceptable explanations of the current situation. In the following we shall look into two such re-evaluations, connected with the fundamental changes which have taken place in the employment structure.

THEORETICAL STARTING-POINTS

1 During the last few years there has emerged a whole series of hypotheses that the labour market is divided into several segments, the admission into these segments being restricted only to a part of the working force due to a number of social and technological reasons. Labour market theorists further state that terms of employment, on-the-job-training, wages etc, differ in the different segments and that the mobility between these is strictly limited.

There are variants[1], but usually it is postulated that the character of the labour market is dual, i.e. it consists of one upper and one lower segment. In the lower segment wages are low, the terms of employment insecure, and the possibilities of on-the-job-training and advancement small. A further characteristic is the high mobility owing to the fact that the workers at a certain firm do not have a particularly strong incentive to stay on. Nor are the firms very keen on holding on to their workers, as replacements can be obtained at a comparatively low cost. It might be said, without exaggeration, that the traditional neo-classical theory supplies

an adequate description of the wage level, the mobility etc of the lower segment, where the wage constitutes one of the most important mechanisms of regulating changes in supply and demand.

However, this is not so, as far as the upper segment is concerned. This segment has hierarchic structure. The number of employees is not related to the relative supply of potential applicants with the right qualifications; it is instead determined wholly by technological factors. Usually a firm (government agency, etc) hires more personnel than is actually needed for the day-to-day business, in order to submit them to a selection process. After having gone through this process, however, some have to leave the company while others will climb a career ladder whose height is rather well predetermined within the hierarchy.

On-the-job-training is an important part of the climb up the ladder. In this context it is first and foremost a matter of so-called "specific training", i.e. training that increases the marginal productivity of the employee within the firm but which cannot be taken advantage of by other firms. Since the wage is usually related to the level of on-the-job-training, and since other firms would not be willing to offer the same amount of money, the employee has a strong incentive to stay put. Having invested in the employees on a long-term basis, the firm is also interested in keeping them. This means that the levels of wages and employment differ from those in the lower segment. During the initial phase of the employment period, the wage surpasses the value of the employee's marginal product, while the opposite is true of the period when the employee is at the peak of his productivity. The wage, then, is not linked to short-term changes and is not affected by temporary changes in demand. On the whole it is true that in the upper segment the labour market does not function according to the neo-classical concept with its simple and painless regulation of supply and demand. Thus the wages (the prices) are rigid and the adaption to changes in demand is achieved

above all by changes in the number of employees (quantity).

We can conclude, then, that in a historical situation where the lower segment is completely dominating, the neo-classical theory will be relatively relevant when analyzing the over-all function of the labour-market. In a situation where the upper segment is the dominating one, this will not be the case. Such a situation requires theories other than the neo-classical one to analyze the employment and labour market situation. As is evident from the historical background, one of the most salient developments of the post-war era is precisely the marked growth of the upper segment) (white-collar workers) and the simultaneous stagnation of the lower one (blue-collar workers).

2 The second theoretical re-evaluation has been developed partly in connection with the theories of the segmented labour market. It concerns the role of formal education. In recent years several alternatives to the human-capital theory have emerged on the economic aspects of education.[2] It is our contention that these models can be regarded as parts of a more general economic information theory, because they stress that the most important function of education is to create und supply information. There are several variants of these models. We have chosen to classify them in three groups: signalling[3], screening[4] and sorting[5] models, with the signalling and screening models close to the neo-classical tradition, while the sorting models are more markedly linked to certain components of modern labour-market theory. A common denominator is that the view of the function of education and its economic role in society differs completely from that of the human-capital theory. Education is believed to function primarly as an identification instrument or as a screening device giving the employer - or the individual himself - information about the latter's capability and personal qualifications, not so much about his actual skills and knowledge.

In the signalling and screening models it is assumed that the individual has a complete knowledge of his own productive capacity and, further, of how he is ranked as compared to others in this respect. The firms do not possess this information, and hence they treat all individuals as equals at the initial stage.

According to the signalling model the individual will choose a certain type and amount of education in order to reveal his true productivity to the firm. This is believed to happen by means of self selection, among other things; a variant of the theory of comparative advantages, implying that the individual maximizes utility, selecting one and only one of the possibilities (various levels and types of education) available to him. According to the signalling models the type of education *per se* does not give any direct information on the productive capacity of the individual. But since the firms are aware of a negative connection between productive capacity and education costs, the information on the inherent productive capacity of the individual will be transmitted indirectly by means of his choice of education. Education is a relatively efficient instrument of identification since people with a low productive capacity have difficulties in acquiring higher education without great expenses, for example because it will take longer time. This is the reason why firms construct a wage-structure where individuals with higher education will be offered jobs with an expectancy of higher productivity and hence higher wages. The individual then makes a choice, where the investment in education or the supply of information to the firms continues until the marginal cost equals the marginal benefit. The firms observe the individual's choice of type and level of education, assessing his production capacity on the basis of the cost structure and not on the basis of the contents of the education or the scholastic attainments. His choice of education is further taken to be made on *ceteris paribus* assumption, i.e. the possibility of financing the education is the same for everybody irrespective of productive capacity. [6]

The screening models are similar; they are in fact often treated as if they were analogous to the signalling models. However, according to the screening models, schooling has a more autonomous role.[7] An individual informs the firm about his suitability for a certain job in a number of various subjective ways, for instance by his way of dressing and speaking. More objective criteria such as age and socioeconomic background are also used. Education is the most important source of information, however. This is not only due to the fact - as stressed by the signalling models - that the firms attach importance to the individual's conception of his own productive capacity and thus pay attention to how, by means of self selection and on the basis of the cost structure, he chooses a certain type of education. According to the screening models, the firms are also interested in the individual's scholastic attainments. There are several reasons for this: 1 There are marked parallels between the ways in which both the labour market and the school system work. Limited resources force the school to assess the student's productive capacity; information which can be transferred to the firms. 2 The school guides the individual, providing him with the knowledge of his skills and what relative advantages he has over others. 3 The scale of marks used by the school is well-known and accepted in society and contains more information than for instance a testimonial obtained after on-the-job-training within in a firm. Further, the scholastic credits are easy to check and to observe.

As the school supplies direct information on the individual, the aspect of cost will not be as important as in the signalling models. Instead the screening models emphasize that the yield from the investment in education will differ according to people's capacities. A consequence of this is that individuals with an inherant high productive capacity relay this information to the employer to obtain higher wages. They do so by choosing longer and more demanding types of education where persons with a lower productive

capacity would not have been very successful. The final result, however, is the same as in the signalling models. After completed schooling, the productive capacity of the individual is fully identified and ranked in relation to that of others. The task of the school has been to identify the productive capacity, but not to increase the productivity of the individual in question.

The sorting models differ in several respects from both the human-capital theory as well as the signalling and screening models. Thus there is no basic assumption that the individual possesses complete information on his own productive capacity. In the sorting models the interest is focussed mainly on what happens within a firm once the individual has been hired. Hence they may be regarded partly as complementing the signalling and screening models which focus on formal schooling.

In the most simple sorting models the interest is directed towards the labour market, while education is assumed to play a passive role. It is believed that productivity is determined exclusively by the contents and character of a certain position, and not by the qualities or the education of the holder of the position in question. The individual is hired on his formal scholastic merits, but his productivity is not influenced by the knowledge and the education he has acquired. The wage is linked exclusively to the position, and advancement and continued ranking in the internal labour market is regulated by custom, seniority and other institutional arrangements.

The idea that productivity and wages are linked to the position and not the individual and his knowledge and capacity is not new. The idea is to be found above all in a number of institutionally oriented economists, among whom Ivar Berg is one of the most prominent figures.[8] It should be stressed, however, that these models are not particularly well developed as far as economic theory is concerned, one

reason for this being that they are incompatible with conventional economic theory in many respects.[9] Nor is there any convincing empirical support for such a simple sorting hypothesis.[10]

The point of departure of the more advanced screening models is the assumption that, during the recruiting stage, both the individual and the firm possess insufficient information on his capacity. Surprisingly enough, it was not until the late 1970s and the early 1980s that more formal models, based on this assumption, were developed.[11]

The models presuppose heterogeneity in both supply and demand. As regards demand, this heterogeneity is a conseqeunce of the firms producing different goods and services and of their using different techniques, while, as regards supply, it is due to the differences in the individual capacity of carrying out different tasks. The sorting process, whose aim is to allocate the individuals in such a manner that the firm's production is maximized, is simply the market responce to heterogeneity.[12]

Briefly, the sorting is managed in the following way. In most of the models - which, properly speaking, can be characterized as combinations of screening and sorting models - the assumption is that formal schooling serves as an initial filter in the recruiting process, providing the criteria for the initial screening of the recruits in the internal labour market, i.e. it is assumed that formal education has a signalling or screening function in accordance with the above analysis. Then follows a continual competetive, selective, and sorting process which is both time-consuming and costly. In due course the firm accumulates and analyzes more and more information about the employee, based on how competently he has handled the various tasks assigned to him during the sorting process. The individual himself also obtains more knowledge of what tasks he is best suited to perform. On the basis of

the knowledge thus acquired there is an evaluation of the employee's performance, and this evaluation will provide the basis for further sorting. This will go on until the right man is in the right place.[13]

In most of the sorting models - where the analysis is usually conducted in game theoretical terms - the interest is focussed on how, once hired, the workers find the function they are best suited for by means of internal labour market sorting and on the extent to which this sorting is compatible with equilibrium. However, in some models there have been attempts to analyze the recruiting process itself as a sorting instrument. In this context some characteristic traits in labour market mobility, connected with recruiting, have been discussed.[14] It may be assumed *a priori* that a person's search for information about his own optimum capacity is particularly manifest as, after completed schooling, he starts looking around for a job. A young worker who has been recruited by a firm, but whose productivity is low, will give notice on his own accord and look elsewhere for a job that suits him better. This search for information about their own capacity is probably one of the most important reasons behind the high mobility in the labour market evidenced by those who have recently left school.

Evidently, most sorting models are based on the simple assumption that formal education has a singalling or filtering function. It goes without saying that the analysis can be carried one step further. It can be asserted, then, that sorting enters into formal education too; a hypothesis which so far has only been hinted at in the literature in this field. Thus the assumption of the sorting hypothesis that the individual possesses insufficient information about his own capacity seems intuitively to be more realistic than the assumption of the human-capital and the signalling/screening hypotheses that this information is complete. Evidently, one of the most important functions of formal education is to guide the individual and to provide him with knowledge about his own abilities.[15]

It may problably be just as important that formal education gives him information about in what connections he can put these abilities to optimum use. The function of the school system may be said to lie in the analyzing and evaluating of the information about the individual that has accumulated by degrees, information which will supply the basis of a continued sorting within the education system.

This survey, then, may be concluded by a question: Is it a fruitful approach to define the various functions of education theoretically and in isolation, as has been done in the literature in this field, without simultaneously forming verifiable hypotheses where these functions can be separated empirically? Stating that the attempts made so far to separate the different functions are complete failures is hardly saying too much.

Instead, in many respects it is reasonable to consider the actual learning of skills and the screening and signalling function of education as integral parts of a more general sorting process. An essential point is that the education system generates and accumulates information about the individual's capacity, which is then transmitted to the individual himself, to the school, and to the firm. Education increases the individual's productivity in so far as he acquires actual skills. Moreover, he signals his capacity level by his choice of the length and type of education. By means of education he also learns about his potential abilities and what advantages he has as compared to others. The learning of skills, signalling and accumulation of information about the individual's capacity are here simultaneous functions of education.

And so we have nearly come full circle. The human-capital, signalling/screening and actual sorting models may be regarded as parts of more general information and search theory with the respective models emphasizing different aspects of the information flow. According to the human-capital

theory, education has a direct productivity-augmenting effect owing to the transmission of information to the individual in the form of knowledge and skills, the individual possessing complete information about his capacity to make use of this knowledge. According to the filtering/screening models the individual relays information about his own capacity to the firms by means of his choice of education, he himself possessing complete information about his own capacity from the start. In the sorting models information about the individual's capacity is generated continually by means of education, an accumulation of information which will eventually lead to the individual being allocated in an optimum way. These latter models are based on the assumption that the individual does not possess complete information about his own capacity.

Further, it is reasonable to assume that the three functions of formal education are present to a greater or lesser extent during the various stages of the individual's progress from primary school to - in some cases - retirement. But it may also be assumed that the proportions within a certain stage of education - e.g. academic education - alter over the years owing to changes in the structure of the economy.

Finally, it should be pointed out that the signalling and screening models were developed during the 1970s while in the case of the sorting theories a stringent theoretical formulation is in its initial stage right now. To the best of our knowledge, there have been no attempts so far to empirically place the changes in the labour market and in the employment structure during the last few decades in an explanatory framework of a more general information-theoretical nature.

AIM AND SPECIFICATION OF THE PRESENT STUDY

In the light of the theoretical survey, the following basic hypotheses for our study may be formulated. The changes that

have taken place in the employment structure during the post-war period (the rise in the number of office employees, the increased segmentation in various industries etc.) have resulted in firms attaching less and less importance to the cognitive function of formal education and instead giving priority to its function as creating and transmitting information about the individual (signalling/screening/sorting). In the present study the emphasis will be laid on higher education.

The changes that have taken place in the employment structure during the post-war period are well known in general terms, but this study must be based on a more detailed description. Hence the first aim of the study is to map out the changes in Swedish economy during the post-war period. As an introduction important factors which can be assumed to have influenced the employment structure will be described and discussed. Examples of such factors would be technical development, patterns of investment, and the growth of the public sector. However, it should be stressed that this part of the study is meant to serve as a framework for the subsequent analysis and that our aim only is to present a survey of the factors behind the changes in the economy. Instead, the emphasis of the first part of the study will be on the description of the shifts in the employment structure brought about by the basic economic changes.

These results will form a point of departure for the second objective of the study; to demonstrate from various perspectives the extent to which industry and commerce have given priority to the assortative function of education as opposed to other functions during a period of time. The modern schools of thought in this field, discussed above, have generated a number of hypotheses as to how the various functions of education can be empirically differentiated. The results obtained so far cannot be said to have shown conclusively which functions of education are given priority by industry and commerce. This can be ascribed to the fact that such studies are difficult to conduct empirically. Thus it is more or less impossible to determine on the basis of

observations of age-earnings profiles, whether education results in knowledge which is of use in industry and commerce (the human-capital theory) or if education has a sorting effect. Obviously, the issue is not *whether* but *why* wages and education are usually correlated.

Some of the problems of earlier interpretations may by due to changes in the priorities of industry and commerce over a period of time. However, we do not regard this aspect of change as a problem but as an integral part of the present study. It is likely that the assessments of the relevance of education above all in the recruiting process have changed throughout the years. We shall start, then, by making a survey of the results of earlier studies in this area in order to determine whether they can elucidate the changes that have taken place over the years.

However, the main object of the present study is to conduct an empirical examination of our own. Unlike most international studies in this field we intend to work parallelly with four different methods.

The first approach will be to study the mobility in the labour market, especially in the case of those who have recently left school. Our hypothesis is that mobility is one important indication as to the extent to which the various functions of education have changed and as to whether the segmentation of the labour market has increased.

The second approach will be to study wages at the recruiting stage as well as after a couple of years of employment. An analysis of the age-earnings profile will constitute an important element here. The problems of interpretation in connection with this method necessitates a complement. Hence our third approach will be to study the changes in the hierarchy, i.e. how quickly the individual gets promoted in the internal labour market, primarily during the first few years of employment. The fourth approach will be to analyze the unemployment statistics for people with different levels of

education, not least because these figures will probably mirror cyclical fluctuations which can hardly be observed with other methods. It will also provide indications of an increasing segmentation in the academic labour market.

It should be emphasized that in international literature these approaches have been primarly applied to cross section data. One of our main objectives is, however, to study how the attitudes of industry and commerce have changed as regards the function of education. Accordingly, we shall attempt to base our analysis on time series data. One feasible method would be to start with cohort data (for instance the Central Bureau of Statistics' follow-up studies on those who have passed the final secondary school examination). Since there are but a few cohort bases, these being almost exclusively applicable to analyses of the labour market during the 1970s, we shall also construct cohort series on the basis of cross section data. A major part of this material has already been collected in connection with our earlier project "The Expansion of the Education Sector in Sweden in the Twentieth Century".

It must be stressed that we are not interested in testing the various theories on the function of education, *per se*. Our aim is to use these as a background for a historical analysis of the changes in the labour market and employment structure; for an analysis of what importance these changes have had for the labour market conditions as regards those with a higher education, and for the role of higher education as preparation for a job.

The third objective is to examine to what extent the system of higher education has been adapted to the changes in the employment structure. Here our point of departure is the set of intentions and aims formulated by the Government (and other authorities). In this context we shall scrutinize preliminary analyses and reports, reports of Goverment committees etc., behind the university reforms of the postwar period. It is generally held that an important

factor behind these reforms was the desire to give more scope to elements of vocational training in higher education. A completely different view is, however, that the actual development in the field of education has largely been the opposite; that is, the screening function of higher education has gradually become less efficient. Thus the great influx of undergraduates in the fifties and sixties was mainly in the Faculty of Arts. Moreover, the 1969 Curriculum of the Faculties of Arts and Sciences (the so-called PUKAS-reform) was made less rigid in the first half of the seventies. In fact, it was not until the university reform of 1977 that the fixed courses of study with a marked element of vocational training came to dominate higher education. Nevertheless, it is difficult to make an *a priori* pronouncement as to whether this has led to more efficient screening. Hence we intend to compare the original intentions with the actual results as regards the adaption of higher education and to relate the results from this comparison with those from the preceeding sections of our study.

If the screening function of education has become increasingly important over the years, the attempts to steer higher education in the direction of vocational training would seem to have been less than successful. Hence, in the context of our third major issue we intend to analyze how the supply of various categories of skilled workers has influenced the Swedish economy in the seventies. Needless to say, this discussion will be relatively speculative.

Rolf Ohlsson
1984-12-03

1 According to Glen Cain three different schools can be discerned in the field of segmented labour market theories: 1 The job competition theory (Thurow, Lucas); 2 The dual theory (Piore, Doeringer, Harrison, Bluestone); 3 The radical theory (Wachtel, Edwards, Reich, Gordon, Franklin, Resnick, Bowles, Gintis). See Glen C. Cain: The Challenge of Segmented Labour Market Theories to Orthodoc Theory: A Survey", *Journal of Economic Literature*, No 4, 1976.

2 Kenneth Arrow's article "Higher Education as a Filter", *Journal of Public Economics*, 2, 1973, is generally considered to be the pioneering work in the field, even if the idea that education functions as a transmitter of information obviously had been presented before. See for instance the introductory footnote in J. Stiglitz: "The Theory of 'Screening', Education and the Distribution of Income", *American Economic Review*, June, 1975. In this context it should be mentioned that a number of theories are being formed and tested right now in international research. For one thing this means that the survey and the classifications presented here would hardly be as generally accepted as a corresponding survey of the human-capital theory. This is particularly true of the sub-groups.

3 See for instance J.E. Stiglitz: "The Theory of 'Screening' Education and the Distribution of Income", *American Economic Review*, June 1975.

4 See for instance M. Spence: "Job Market Signaling", *Quarterly Journal of Economics*, August 1973.

5 See for instance S. Ross, B. Taubman and M. Wachter: "Learning by Observing and the Distribution of Wages" in S. Rosen (ed.): *Studies in Labour Markets*, National Bureau of Economic Research, Chicago, 1981

6 The Signalling models have been developed mainly by Michael Spence. Apart from the work mentioned above, see M. Spence: "Job Market Signalling", *Quarterly Journal of Economics*, August 1973 and M. Spence: "Signalling, Screening and Information" in S.Rosen (ed.): *Studies in Labour Markets*.

7 The most prominent figure is Joseph Stiglitz. See note 3.

8 I. Berg: *Education and Jobs: the Great Training Robbery*, New York, Praeger, 1970.

9 Se also M. Spence: "Signalling, Screening and Information".

10 D. Wise: "Personal Attributes, Job Performance and Probability of Promotion", *Econometrica*, Vol. 43, No 5-6, September-November 1975.

11 See for instance K. Burdett and D. Mortensen: "Testing for Ability in a Competative Labor Market", *Journal of Economic Theory*, August, 1981.

12 A more detailed account of the hypotheses behind this is given in G. MacDonald: "Person-Specific Information in the Labour Market", *Journal of Political Economy*, No 3, 1980 and "A Market Equilibrium Theory of Job Assignment and Sequential Accumulation of Information", *The American Economic Review*, December 1982.

13 Apart from the works referred to in notes 11 and 12 see also M. Harris and B. Holmström: "A Theory of Wage Dynamics", *Review of Economic Studies*, July 1982; W. Johnson: "A Theory of Job Shopping", *Quarterly Journal of Economics*, May 1978; G MacDonald: "Information in Production", *Econometrica*, September 1982; E Prescott och M. Visscher: "Organization Capital", *Journal of Political Economy*, June 1980; S Ross, P. Taubman and M. Wachter: "Learning by Observing and the Distribution of Wages" in S. Rosen (ed.), *Studies in Labor Markets*.

14 See e.g. W. Johnson: "A Theory of Job Shopping" and B. Jovanovic: "Job Matching and the Theory of Turnover", *Journal of Political Economy*, October 1979, No 5, part 1.

15 In his screening model J. Stiglitz touches on the same train of thought, but he does not develop this line of reasoning as he presumes that the individual possesses complete knowledge about his own capacity.